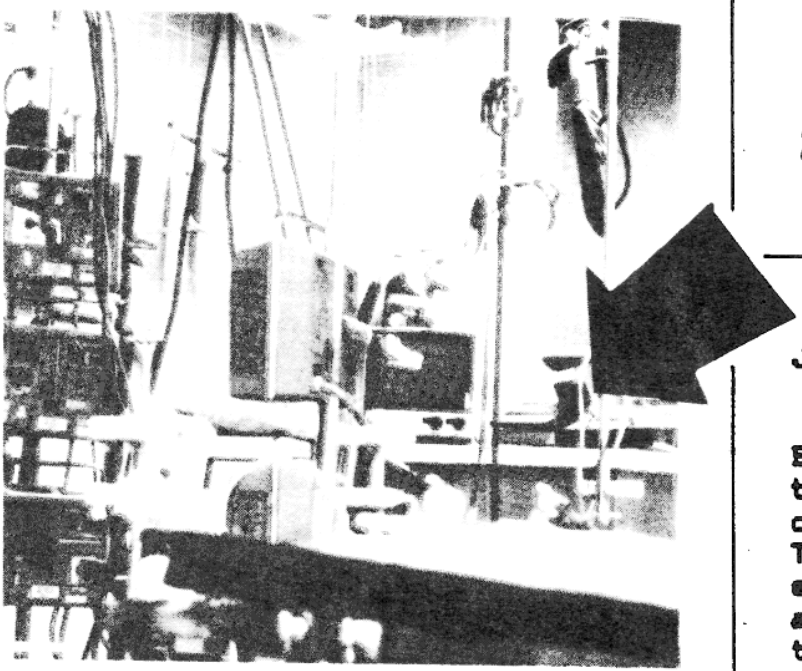
The Boston Computer Society

SINCLAIR-TIMEX USER GROUP NEWSLETTER

February 1984 Volume 3 Number 2

TS1000 IN THE OPERATING ROOM

by Robert Douglas



A Timex Sinclair 1000 is being used in Open Heart Surgery Cases at the University Hospital in Boston to perform repetitive calculations of hemodynamic status. The calculations were originally performed by hand until the advent of the programmable calculator. The programmable calculator reduced calculation time dramatically, but it too had drawbacks. For example, inputting and outputting parameters from the wrong register of the calculator. With the Timex Sinclair computer this problem is eliminated . The TS1000 can print out the input parameters and the calculated parameters

1984 **MARCH** 1984

SUN	MON	TUE	WED	THU	FRI	SAT
New M. 2nd	First Q. 10th	Full M. 17th	Last Q. 24th	1	2	3
4	X	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

January Meeting Highlights

Because of a surprise snowstorm the January regular meeting was cancelled at the last minute. The message didn't get out to everyone, though, and an abbreviated meeting convened in the small science auditorium downstairs from our regular meeting place.

Led by Will Stackman and Jack Hodgson the meeting consisted of a demo by Will of the ZX LRB fast loading program from G Russell Electronics.

The bulk of the meeting consisted of a free-wheeling discussion of the Timex and Sinclair computer communities. There was much concern about the intentions and health of The Timex Computer Corp.

Although sparsely attended the meeting was interesting. For future reference, meeting cancellations will be announced on WHDH (850 AM) and WVBF (105.7 FM).

The Boston Computer Society helps make sense out of personal computers. If you're interested in computers for home, business or education, come to The BCS for objective information and support. The BCS is the largest nonprofit personal computer association in the United States. our goal is not to promote any particular brand of computer, but to help computer users and people who just want to know what a computer could do for them.

Sign me up for these user/interest groups:

- ☐ Apple/Boston (Apple)
- ☐ Atari User Group
- ☐ Business User Group
- ☐ Consultants & Entrepreneurs Interest Group
- ☐ Database User Group
- ☐ Displaywriter User Group
- ☐ Educational Resource Exchange
- ☐ 80/Boston (TRS-80)
- ☐ Family Home User Group
- ☐ Logo User Group
- ☐ IBM User Group
- ☐ North Star User Group
- ☐ Osborne User Group
- ☐ OSI/Boston (Ohio Scientific)
- ☐ Pascal User Group
- ☐ PET/CBM/VIC User Group
- ☐ Robotics Interest Group
- ☒ Sinclair/Timex User Group
- ☐ Telecommunications User Group

*** ZX PRO/FILE ***
a 16K+ file manager for the Timex

ZX PRO/FILE is a machine language data base that gives you tremendous versatility:

*instant access to any file stored in memory
*files of any size in the same program run
*single or multiple word search capabilities
*ordered file displays
*comprehensive programmable printer functions

A 59 page manual comes with the cassette. In it are complete instructions, examples, directions for upgrading to larger memories, modifications, program listings, and a detailed explanation of how the program works. There's even an introduction to machine coding for beginners.

ZX PRO/FILE is the best file manager you can get for your Timex. In fact, users report that it provides data handling functions found only on the most sophisticated systems.

Price: just $16.95

Let me send you full specifications. Write to:

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10 REM

There are typos and there are typos. Last month the M/L Group highlights piece stated repeatedly that that group meets on the first monday of the month. That's not true. It meets on the first wednesday.

We try to be very careful about typos in this publication. Especially those in technical items like data or program listings. But the way this letter is put together, particularly the shortage of manpower, result in some jobs, like proof-reading, get less attention than others. And that brings me to my second item here.

We really need some more help putting this newsletter together. Particularly we need help with collecting and editing the stories (an associate editor) and someone to help with the typsetting and "cut and paste" work of creating the letter (graphic artists). This newsletter is an important endeavor and we are more fortunate than other BCS newsletters in that we have a strong core of devoted contributors. Other larger groups are impressed with the supports we get. But now we need a bit more support. If you have some abilities along these lines call me.

Lastly, the new BCS office is now open. It is located at One Center Plaza, at the other end of the plaza from the old office. It is a wonderful facility and is going to be a real asset to the Society's growth. Stop by and visit.

A final note: Do you know what the difference is between the Timex Computer Corp. and a Boy Scout Troop? The Scouts have adult supervision.

The Boston Computer Society

This newsletter is produced to inform group members of the agenda and logistics of future meetings, as well as to recap and amplify the information provided at the meetings. It also provides a forum for members and interested parties to communicate what thay have learned or developed relating to Sinclair and Timex computing. Meetings are open to the public (non-member admission is $3); however attendees are encouraged to join the Boston Computer Society (BCS) This newsletter is free to members. Back issues are one dollar each.

DIRECTIONS TO MEETING: The S-T User Group meets in the Large Science Auditiorium (Room 8/2/ 009) of the University of Massachusetts, Boston Harbor Campus. It is located only 3 miles from downtown Boston and easily accessible by public and private transportation. From the north or west, take the Southeast Expressway to Exit 17.

Turn left onto Columbia Road. Follow construction signs to get to Morrissey Boulevard in the direction of UMASS and the Kennedy Library. Bear right on traffic island, get in the right two lanes, following UMass/ Boston signs. Turn left at the light into Campus. From the south, take Morrissey Boulevard northward to the campus. On the MBTA, take the Red Line (Ashmont Train) to Columbia Station. Transfer to the free University shuttlebus in the T parking lot.

plugs 1,2,and 3 into your little equation and gives you back the answer, in this case putting it in the variable X. The values you pass to the funtion don't have to be actual numbers but can be other variables:

```
X = FN Z (M,N,O)
```

where M,N, and O have been established earlier in the program.

The following example show a more practical use of DEF FN. It goes like this:

```
DEF FN S (A,B,C) = (A>B)*(A-B)+B
-(B-C)*(B>C)
```

This function is quite useful as a kind of bandpass filter; that is:

```
FN S (left,x,right)=
     left, if X<left;
     X, if left<=X<=right
     right, if X>right
```

The function could be used, for example, in a game program to keep an object within bounds. It's also interesting to note that:

FN S (X,Y,Y)=Maximum of (X,Y)
and
FN S (X,X,Y)=Minimum of (X,Y).

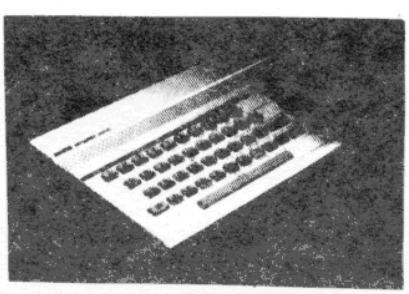
BU 1000 continued

The system consists of the, Sinclair ZX81 computer with 16K memory, the TS2040 printer and a Sony Television which has been adapted to run off 12 volts DC to meet Hospital Electrical Safety Codes. The Timex supplied power supply for the computer and printer proved to be inadequate for our application, so a new one was designed which runs cooler and is more reliable. The computer is left on constantly to prevent reloading the program daily (incidentally, it has not crashed in the six months that it has been in use).

Although the Timex Sinclair computer is considered a toy by some when compared to other larger and more expensive computers, there are applications for it where large computing power is not required.

Our system, which cost under $200, is thousands of dollars cheaper than current models disigned for this application.

[Robert Douglas is a Clinical Engineer with the Anesthesia Department of the University Hospital, Boston University Medical Center]



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The Sinclair Timex Newsletter is published monthly by the Sinclair Timex User Group of the Boston Computer Society. Membership in the BCS is $24 per year which includes a subscription to its magazine "The Computer Update" and subscription to two of its group newsletters (such as this one).

Advertising space is available in this publication on a limited, first come first served basis. The rate is $60 per quarter page. At this time no other ad sizes are available. For detailed rate and discount information contact the Advertising Manager or the Publisher.

M/C GROUP HIGHLIGHTS

The machine code sub-group met, as usual, on the first Wednesday (NOT MONDAY AS STATED HERE LAST MONTH) at Itek Optical Systems in Lexington. Attendance continues to grow in size and enthusiasm.

The meeting was opened with a brief presentation by Jack Hodgson of the Zeus Assembler package for the TS2068 Color Computer. The Zeus allows the m/c programmer to enter their code with mnemonics and symolic jump and call addresses. "This is a terrific tool. It simplifies the coding process by a significant factor. I don't know how I ever managed without it," remarked Hodgson enthusiastically. The Zeus Assembler is from SoftSync.

Dave Wood showed the group his newly arrived Compusa 5 1/4 inch floppy disk system for the 1000/1500 computers. "I really love it." He said. The drive loads and saves programs and data much faster than the standard cassette unit. Although Dave's drive was ordered in October and just arrived recently. It is believed that Compusa is now shipping the drives promptly.

The group viewed a demo of G. Russell's ZX LRB fast loading program. ZX LRB will load, from cassette, 16K in approx. 60 seconds.

Group leader Bob Heath plugged the special presentations coming up in March (see elsewhere in this letter), and urged members to participate in the Dazy Project.

The Machine Language and Hardware Design Sub-Group meets on the first Wednesday of the month at Itek Optical in Lexington. For details and directions call Bob Heath days at 276-2424.

ports available for IN use only (using A1).

INTERRUPTS

It should be noted that the Z80 interrupt system is pretty much tied up by the Timex operating system in order to maintain the TV display. It might be possible to utilize mode 2 interrupts by operating exclusively in FAST. In this case, the I register, normally used for TV character generation, could be used to vector the interrupt out of the ROM and into the user's application routine. An additional complication is introduced by the fact that the A6 address line is tied to the Z80 INT line. To the best of my knowledge, no one has made use of interrupts on the Timex computer.

INSIDE INFO FROM ZILOG

On March 7 the Machine Code Group will host Mitch Russo of Nova Sales at their regular meeting (first WEDNESDAY). Mitch owns a ZX81. That in itself may not seem too interesting, BUT he bought it so he'd have something to run his emulator on. You see Mitch is the local representative for Zilog and in addition to promoting sales of their products he is an enthusiast of the peripherals the Z80 will support. Over the years he's built a sizable home-made system.

So, if you want to find out what an emulator is and hear lots more about the inner workings of the Z80 microprocessor that's at the heart of all the Timex Sinclair computers, come join with us on the 7th.

Mitch has made one request: he asks that each of us bring to the meeting a sheet of paper describing some Z80 software or hardware project that we've either completed or are working on.

For details on last month's meeting and info about attending see the machine code group highlights elsewhere in this newsletter.

DEF FN COMMAND ON THE TS2068

by John Kemeny

The TS2068 has a feature that allows users to define one line functions. If you have a math formula that is used many times in the program you can program it into a 'function' and 'plug' any values you choose into it. For example if you were going to multiply two numbers together and then divide the result by a third the formula might look like this:

(A*B)/C.

You turn this into a function by using the DEF FN (beneath the "i" key), it comes out looking like this:

DEF FN Z(A,B,C)=(A*B)/C.

You've now created a function called Z. When you go to use this function you 'pass' the values for A,B, and C by putting them in parenthesis following the function name. For example X= FN Z (1,2,3). The computer

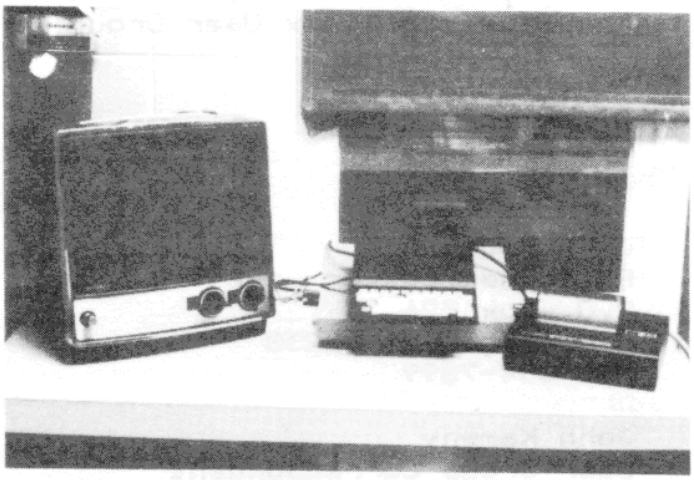
BU 1000 continued

and label each one to avoid interchanging the values. The physician can instantly determine whether the readings are valid and take appropriate action.

The program instructs the physician to enter the patient's weight, height, cardiac output, heart rate, and blood pressure measurements (MPAP, PCWP, MAP, and CVP). It then calculates body surface area, stroke volume, stroke index, cardiac index, systemic and pulmonary resistance, right and left heart stroke work index, and the ratio of left and right heart resistance. These calculated parameters give the physician valuable data on the patient's condition and what mode of therapy to administer. The use of the computer allows the physician to determine these parameters rapidly and to interpret them before they become obsolete. Shown below is what is displayed on the television at the start of the program to instruct the physician on how to enter each of the input parameters. The program also performs a self test on itself to insure that it has loaded properly, and prints out that it has passed.

```
SELF TEST OK

ENTER WEIGHT IN LBS., HIT ENTER
200
ENTER HEIGHT IN INCHES,HIT ENTER
70
ENTER CARDIAC OUTPUT, HIT ENTER
5.2
ENTER HEART RATE, HIT ENTER
60
ENTER MPAP,HIT ENTER
15
ENTER PCWP, HIT ENTER
10
ENTER MAP, HIT ENTER
80
ENTER CVP, HIT ENTER
5
```



Shown below are the computed parameters along with the input which are printed out on both the television and the printer. The patient's name can be filled in along with the date and time. Each printout is numbered in consectutive order at the top left hand corner next to the patient's name. The weight and height have to be entered only once for each patient and are stored in the program until the end of the case.

```
#1 PATIENT        DATE    TIME

WEIGHT : 200
HEIGHT : 70
C.O.  : 5.2
H.R.  : 60
MPAP  : 15
PCWP  : 10
MAP   : 80
CVP   : 5


SURFACE AREA =2.1
STROKE VOLUME = 83.3
STROKE INDEX = 39.9
CARDIAC INDEX = 2.4

SYS VAS RESIS = 1200
PUL VAS RESIS = 80

LV SWI = 38
RV SWI = 5.4

SVR/PVR = 15
```

IN's AND OUT's ON THE TIMEX COMPUTER

by Dave Wood

OVERVIEW OF Z80 I/O

There are three types of input/output (I/O) instructions available on the Z80 microprocessor inside your Timex. All generate a 16-bit address, providing a potential of 65536 I/O ports.

1. Accumulator I/O [IN A, (n) OUT (n), A]. The byte "n" provides the lower 8 bits on the address bus, and the A register provides the high order 8 bits. The data is then read into the A register from the data bus (IN) or onto the data bus from the A register (OUT). Note in the use of OUT, that the A register plays a dual role. The output byte also forms the high address byte, limiting practical applications to 8-bit port addresses.

2. General register I/O [IN r, (C) OUT (C), r]. The C register provides the lower 8 bits on the address bus, and the B register provides the upper 8 bits. The data is read into or out of the specified register, r.

3. Block I/O. Block I/O instructions are available to move data between the port addresses by the BC register and the memory location pointed to by the HL register.

I/O RESTRICTIONS ON THE TIMEX

The number of I/O ports actually available to machine language programmers on the Timex is quite limited. In general the lower three bits (A0, A1, A2) are reserved for control of the computer. Furthermore, the high order 8 bits may contain random data, so must be ignored. This limits the user to 31 uncontested I/O ports.

Bit A0 is used to control the keyboard read as well as cassette input and output. If A0 is low (logical 0), then an IN command will activate keyboard scan, read the cassette input line, and set the cassette output line low. An OUT command with A0 high sets the cassette output high. TV output is on the same signal line as the cassette, so these IN/OUT operations will flash on the display.

Bit A1 (in combination with A0) is used to control the SLOW/FAST mode; it enables/disables generation of the non-maskable interrupt (NMI) every 1/60th second. OUT with the two lower bits containing 10 activates the NMI generator for the SLOW mode. OUT with the lower bits containing 01 turns off NMI and the computer runs in the FAST mode. If both bits are zero (00), then the system will crash.

Bit A2 is used to control the Timex Printer. Bit A2 low will enable the printer.

SUMMARY OF I/O LIMITATIONS

For unrestricted input/output, there are 31 ports available. Bits A0-A2 must be high to not impact the system operation, other than toggling the cassette and TV signal lines. Thus the available ports are (in hex) 07, 0F, 17, 1F, . . . , E7, EF, F7. Port FF is used for writing to the tape cassette. If the Timex printer is not being used, then 32 more ports are available, making use of the A2 line. Furthermore, since OUT is the most restrictive (due to the NMI setting) there are 32 additional

continued next page